SECTION 4

# 4 Basis of Cost Estimates

Opinion of probable construction costs (OPCC) for infrastructure improvements necessary for the service line extensions to the potential participants were developed. The cost estimating rationale is presented in this section to clarify the level of cost detail provided for this study. Cost estimating assumptions used to complete the estimating process were established. The methodology used to determine cost responsibility for each of the participants along the individual connection lines is presented below.

## 4.1 Cost Estimating Rationale

OPCC estimates were prepared for planning and decision purposes based on the delivery requirements and infrastructure improvements for each service line extension. The OPCC estimate for each service line was developed based on engineering data and mapping from which quantity surveys were developed to input into estimating assemblies developed by HDR in Timberline Estimating Extended software. Data used to prepare the quantity surveys are illustrated in the mapbooks developed for each line, which are shown at a 1 inch to 200 feet scale (and in a few cases 1 inch to 100 feet) layouts with the overall connection waterline alignments with pipe sizes, locations of connections, taps, meters, valves, and system delivery requirements. The standard details summarized in Section 2 form the basis for the construction cost database item selected for each item of work. Quantity surveys can be found in Appendix B.

The cost estimates were prepared based on Class 4 Association for the Advancement of Cost Engineering (AACE) International Recommended Practice cost estimate classification system. Class 4 AACE International or Concept/Feasibility cost estimates assume a 1% to 15% project definition with an expected accuracy range of +40% to -20%. The range of accuracy also speaks to the expected range in Bids received if plans with 1% to 15% project definition were issued for bids. Undefined scope of work, or estimating contingency, percentage of 20% was used for each of the connection lines. This percentage reflects the lack of design information with 1% to 15% plan development and is intended to cover work known to be required in this type of Project but lack of design definition prevents develop of quantities or more accurate allowances. This percentage is not intended to cover scope changes as the result of new program information. Description of the five classes of cost estimates and the basis of OPCC estimates can be found in Appendix C.

HDR's estimating construction cost database is based on the RS Means construction cost database with enhancements by HDR which is updated quarterly. OPCC estimates for this project utilized 1st quarter 2010 construction database cost items with open shop wages adjusted to northeast Wyoming. Specialty scopes of work such as the steel storage tanks and taps on large steel pipelines were estimated using budget proposal received from specialty contractors performing that type of work. Project-specific equipment such as pump stations, meters, and specialty valves were obtained from local venders (Front Range area). Appendix D contains a portion of the vendor-specific data acquired for cost estimating purposes. The OPCC estimates are presented in 2010 dollars. No escalation of costs has been included since the overall project schedule is unknown at this time.

## 4.2 Cost Estimating Assumptions

Cost markups and assumptions used to develop the OPCC estimates for each connection line our stated below. OPCC estimate construction markups used to develop the unit cost were applied in a compound manner in the order listed below:

- Prime Contractors Field General Conditions, trailers, supervision, etc; Mobilization and Demobilization - 7%.
- Sales tax on material and rental equipment - 5%.
- Prime contractor's Home Office overhead, profit and risk - 12%.
- Contractor's Bond and Builder's Risk insurance - 1.5%.
- Overall Undefined Scope of Work, (estimating contingency) - 20%.
- For work likely to be performed by a subcontractor (pump stations and tanks) a subcontractor markup of 15% was added before applying Prime Contractor Home Office Overhead, Bond or Undefined Scope of Work markups.

Specific project assumptions made in the development of the OPCC estimates were:

- All waterlines were estimated with a depth of cover of 6 feet 6 inches with trench boxes for full height of the trench.
- Trench width was estimated as 1 foot either side of the pipe diameter with stone bedding from 6 inches below to 6 inches above the pipe.
- No rock blasting for excavation was included in the estimate for waterlines or other structures. All rock was assumed to be rippable by standard excavation equipment.

- All pipelines were estimated using PVC Class 250 C900 SDR 18 pipe material with ductile iron mechanical joint fittings and concrete blocking at all fittings.
- All valves except the tapping valves were estimated using ACIPCO gate valves with cost for valve box and installation.
- Connections to large diameter steel pipe was estimated based C303 steel pipe, wrapped and coated, 1/3 diameter weld-on pipe saddles and Mueller gate valves. Budget pricing for this work was received from Municipal Pipe Services (Hastings, NE).
- Trench width surface replacement for gravel roads and driveway was accomplished with 4 inch deep compacted crushed aggregate.
- Trench width surface replacement for asphalt pavement roads and driveway was accomplished with 4 inch deep compacted crushed aggregate and 4 inch deep hot bituminous asphalt pavement.
- Trench width surface replacement for concrete pavement roads and driveway was accomplished with 6 inch deep 3000 psi wire mesh reinforced concrete.
- Chlorine booster stations have been included in the estimate using a $50,000 allowance until further design work is completed.
- Pump Station budgets were estimated using budget quotes from Metron (Denver, CO) for package pump stations, installation standards for same and an allowance of $100,000 for sitework, yard piping, and site restoration.
- Storage tank budget were estimating using budget quotes from Brown Tank Company (Saint Paul, MN) plus $25,000 for each tank for site work, yard piping, and site restoration.
- Bore and jacking was estimated assuming borable material, 1/2" casing and spacers with bore pits on both side of the road.
- Master meters were established estimating the standard detail with bypass, ductile iron pipe, with budget quotes for the meters with radio-read transmitters from Rocky Mountain Valve and Control (Denver, CO).
- Air/vac vaults were established estimating the standard detail with a single 2 inch combination air/vac valve, ductile iron pipe and isolation valves.

- Altitude and PRV valve vaults were estimated with the standard detail, including ductile iron pipe, Cla-Val PRV and altitude valves, budget pricing from Rocky Mountain Valve and Control (Denver, CO).
- Blowoff assemblies were budgeted using the standard detail provided.
- Domestic connections were estimated assuming the main line can be shutoff for sufficient time to permit a dry connection using ductile iron pipe, fittings and valves.

## 4.3 Cost Responsibility Allocation

The OPCC estimates developed in this study have not been broken down to a participant level. This will be completed during the JPA process. The costs presented in this study are the total to construct each of the connection lines as established in Section 5.